possible to summarise the number of important papers that were read upon the housing question, child-study, port sanitation, and other subjects. Dr. Hope, the local secretary, is to be congratulated upon the arrangements made, and it is hardly necessary to add that Liverpool extended a hearty welcome to the delegates and members of the congress. R. T. HEWLETT.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

A REPORT on the scheme for the establishment, in London, of an institute for advanced technological instruction and research, recently put forward by Lord Rosebery, was presented to the London County Council on Tuesday. It will be remembered that the offer was made of land, buildings, and equipment required for such an institution to the value of 500,000*l.*, with the promise to secure other funds for both capital outlay and maintenance, provided that the council would express, in general terms, its willingness to contribute, when the buildings were equipped and ready to be opened, a sum of 20,000*l.* a year towards the maintenance of the educational work. In referring to these proposals in our issue of July 2 (p. 203), we pointed out the importance of coordinating the work of such an institute with that of the University of London, and expressed the opinion that the development of both was a national concern, and ought not to depend upon the contributions of the County Council. We are glad to see that the committee of the council appointed to consider the scheme regard substantial assistance from the State as an essential condition of support, and think the council should not lend any encouragement to the idea that the whole of the cost of maintenance could be provided from London sources. The following recommendations of the committee were adopted by the council at Tuesday's meeting:—(*a*) That the council expresses its high appreciation of the important proposal contained in Lord Rosebery's letter, and would cordially welcome the establishment of further provision in London for advanced technological teaching and research. (*b*) That the council, in response to the request contained in Lord Rosebery's letter, places on record its opinion that, when the land, buildings, and equipment for the proposed additional technological teaching and research are provided to a value of not less than 500,000*l.*, the council will be well advised to contribute, out of the moneys annually placed at its disposal under the Local Taxation (Customs and Excise) Act of 1890, a sum not exceeding 20,000*l.* per annum towards such part of the work as falls within the statutory definition of technical education, subject to the following conditions:—(1) That a scheme be prepared to the satisfaction of the council for the constitution of the governing body and the adequate representation of the council thereon; (2) that financial arrangements adequate to the whole maintenance of the proposed work are made to the satisfaction of the council; (3) that, in view of the national scope and utility of the proposed work, substantial contributions towards maintenance be made from funds of a national character; (4) that due provision be made in the scheme to prevent overlapping and secure coordination of the work already carried on by the university colleges, polytechnics, and other science and technological institutions, and the proper connection of the whole with the university; (5) that a sufficient number of scholarships, including free places, be placed at the disposal of the council; (6) that it be considered whether other counties and boroughs should not be invited to contribute towards the maintenance, receiving in return the right to send their picked scholars for instruction under the proposed scheme.

THE Board of Education have issued new regulations for the instruction and training of pupil teachers and students in training colleges. In a preface by Mr. Morant it is stated that the "regulations are intended to secure for the pupil teacher a more complete and continuous education, and to make the period of service in an elementary school a time of probation and training rather than of too early practice in teaching." Pupil teachers admitted on and after August 1, 1904, must not be under sixteen years of age, except in rural districts, where the limit will be fifteen. After August 1, 1905, pupil teachers will not be permitted to serve in a public elementary school more than half the time the school is open, and they will be required to receive half-time instruction in an approved pupil teacher centre throughout their engagement. The Board of Education desires to encourage plans for educating pupil teachers with other scholars, and urges local educational authorities to arrange, by means of an adequate scholarship system or otherwise, that all the best candidates for pupil teacherships, whether boys or girls, should receive a sound general education in a secondary school, with schoolfellows intended for other careers, before they commence service in any capacity in an elementary school. There is already in existence a number of well-equipped and well-staffed pupil teacher centres, the best of which have more than fulfilled the purpose for which they were originally recognised by the Board. The new regulations should assist in developing corporate school life in such centres, and also in improving other less satisfactory central classes; they mark a very decided step in advance, and show an exact appreciation of the shortcomings of the pupil teacher system as it has existed until now.

A SCHEME whereby pupils in schools in different parts of the Empire may be put in communication with one another, with the view of exchanging observations, specimens and ideas, has been drawn up by the League of the Empire, and promises to be of great educational value. The committee recommends that linked-schools and members should first exchange maps of their respective districts, and where possible, photographs or drawings of their houses, of the school house, grounds and surroundings. It is suggested that nature calendars should be kept, essays written on common trees or other plants, and notes made on the habits of birds or other animals, or on industrial processes or natural products in the neighbourhood of the schools—all with the view of exchanging them with schools in other parts. Personal observations are to be insisted upon, so that the descriptions will be twice blessed—those who make the observations by exercising the best of their faculties, and those who receive the results by gaining knowledge of natural conditions beyond their individual view. Specimens are also to be exchanged for school museums. Already there are nearly two thousand members in correspondence all over the Empire exchanging specimens and letters, and the number will doubtless be greatly increased. Particulars of the scheme may be obtained from Mrs. Ord Marshall, hon. secretary of the central committee, 11 Dartmouth Street, Victoria Street, London, S.W.

To prevent misunderstanding, Mr. C. McDermid, secretary of the Bessemer Memorial Fund, has issued a letter in which the relationship between the scheme for the Bessemer memorial and that put forward by Lord Rosebery is described. The persons responsible in each case have been in close consultation throughout, but the two schemes will continue for the present to be directed separately, though they will be controlled by joint trustees. For the purposes of the advanced metallurgical training and specialised research works which are to form the Bessemer memorial, it is proposed that London shall be regarded as the centre for the metallurgy of copper, silver, gold, &c., Sheffield as the centre for steel, and Birmingham as the centre for cast and wrought iron and alloys. It is intended that the post-graduate scholarships shall, in part, be international. It is hoped that the committee will be able to submit the complete scheme in October.

DR. W. SCHLICH, principal professor of forestry in the Royal Indian Engineering College, Coopers Hill, has been appointed honorary professor of forestry at the Royal Agricultural College, Cirencester. Mr. McClellan, jun., who was recently appointed professor of forestry and estates management at the college, has, during the past four months, been gaining experience of continental forestry, and with Dr. Schlich has made a six weeks' tour through specially interesting forest districts in Germany.

MR. H. W. RICHARDS has been appointed principal of the Brixton Technical Institute of the London Technical Education Board. The Board has made the following appointments in connection with the Paddington Technical

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Institute:—Head of the chemical department, Dr. H. Reynolds; head of the physical department, Mr. J. H. Vincent.

THE following research fellowships and scholarships have been awarded by the executive committee of the Carnegie Trust for the universities of Scotland. *Research Fellowships.*—Chemical: Dr. C. E. Fawaitt, Dr. J. C. Irvine, Mr. W. Maitland. Biological: Dr. J. Cameron. Historical: Dr. D. Mackenzie. *Research Scholarships.*—Physical: Mr. J. H. MacLagan Wedderburn, Mr. H. W. Malcolm, Mr. J. R. Milne, Mr. T. B. Morley. Chemical: Mr. J. Knox, Mr. J. Johnston, Mr. F. J. Wilson. Biological: Mr. S. F. Ashby, Dr. R. T. Leiper, Mr. H. J. Watt.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 28.—"Researches on Tetanus." By Prof. Hans **Meyer** and Dr. F. **Ransom.**

The experiments were in the first place made with the object of finding an explanation for local tetanus. One of the earliest and most striking symptoms of tetanus in man is, as its popular name implies, stiffness of the masseter muscles (lockjaw); this is the case wherever the infected wound may be situated. In certain animals, however, as cats, dogs, and rabbits, when tetanus toxin is injected subcutaneously into a limb, the first symptom is a rigidity of the muscles of the injected member; this is known as local tetanus. Afterwards, if enough toxin has been given, the rigidity becomes general. An experimental explanation of this condition has hitherto been wanting.

The authors believe that their experiments prove conclusively that the course of events in experimental tetanus is as follows:—The toxin is taken up from the point of injection by the motor nerves (probably their naked endings). Passing along these it reaches first the corresponding motor centres in the spinal cord and excites there an over-irritability, so that the discharges which normally give rise to muscular tone become abnormally strong, and produce in the muscles of the injected limb the condition known as tetanic rigidity. The toxin also passes from the point of injection into the lymphatics and thence into the blood.[1] From the blood-lymph stream, if enough has been given, other motor nerve ends take up toxin, and general muscular rigidity ensues.

The authors show experimentally that the toxin only reaches the nervous centres by way of the motor nerves, and further, that the movement of the toxin in the nervous system does not take place in the lymphatics, but in the protoplasm of the nerves. Tetanus toxin never reaches the spinal centres along the sensory nerves, but, if it is injected into a posterior root, sensory disturbance is the result.

The greater part of what is known as the period of incubation, that is, the interval which elapses between the injection of toxin and the first symptom of intoxication, is the expression of the time occupied in the conveyance of the toxine from the periphery along the motor nerves to the susceptible centres.

Relying upon the results of their experiments, the authors are of opinion that the tetanus of warm-blooded animals consists of two processes, separated from each other both in time and space. Of these the one is primary, a motor intoxication, local muscular rigidity; the other, secondary, is a local sensory intoxication, a diffused reflex tetanus starting from the intoxicated neuron.

Repeated experiments showed that, when tetanus toxin was introduced direct into a motor nerve, antitoxin, though present in large quantities in the blood, was unable to prevent the outbreak of the disease, or even to hinder a fatal result. This was the case both when large doses of antitoxin were given before and after the toxin, as well as when an actively immunised animal was employed. The experimenters therefore conclude that injected antitoxin does not reach the substance of the nerve fibrils and centres, and that even with highly immunised animals the neurons remain free from antitoxin. As regards the serum treatment of tetanus, it is clear that in these circumstances any toxin which is already in the motor nerves, though not yet in spinal centres, will not be neutralised by antitoxin, whether injected under the skin or direct into the blood. An attack corresponding to the amount of toxin absorbed by the nerves will break out and run its course in spite of antitoxin. On the other hand, any toxin in the blood or lymph will be rendered harmless by an injection of antitoxin, and so a further intoxication will be prevented.

The authors have further made successful attempts to prevent the access of tetanus toxin along the motor nerve to the susceptible centres by injecting antitoxin into the nerve substance (ischiadicus), so, as it were, blocking the passage of the toxin.

Just before this paper was read, a case occurred at Marburg of a man who received an injury of the hand from the breaking of a flask of tetanus toxin. Antitoxin in large quantity was injected under the skin a quarter of an hour after the injury; nevertheless, after eight days, a local tetanus of the arm broke out. This was treated by injection of antitoxin into the nerve trunks of the affected limb, and the patient recovered. The occurrence of a local tetanus in spite of the large quantities of antitoxin, and the satisfactory result which followed, and perhaps was due to the injection of antitoxin into the motor nerves of the affected limb, show that the conveyance of the poison from periphery to centre takes place in men, as in animals, along the motor nerve, and affords, further, a valuable hint for the treatment of tetanus.

The full report of these experiments appears in *Archiv für experimentelle Pathologie und Pharmakologie*, Band xlix.

June 11.—"Observations on the Physiology of the Cerebral Cortex of the Anthropoid Apes." By Dr. A. S. F. **Grünbaum** and Prof. C. S. **Sherrington,** F.R.S.

June 18.—"Cyanogenesis in Plants. Part iii. Phaseolunatin; the Cyanogenetic Glucoside of *Phaseolus lunatus.*" By Wyndham R. **Dunstan,** M.A., F.R.S., Director of the Imperial Institute, South Kensington, and T. A. **Henry,** D.Sc. Lond.

The poisonous seeds produced by partial cultivation in Mauritius of the plant *Phaseolus lunatus* have been examined and found to contain a cyanogenetic glucoside of the formula $C_{10}H_{17}O_6N$, to which the name *Phaseolunatin* has been given. The glucoside crystallises in colourless needles, and when acted upon by the enzyme emulsin, which is also present in the seeds, or by warm dilute acids, it is hydrolysed into *dextrose, acetone*, and *hydrocyanic acid.*

$$C_{10}H_{17}O_6N + H_2O = C_6H_{12}O_6 + CH_3.CO.CH_3 + HCN.$$

Alkalis convert the glucoside into *phaseolunatinic acid* ($C_{10}H_{18}O_8$), and this, by the further action of hot dilute acids, is hydrolysed into *dextrose* and *a-hydroxyisobutyric acid.* Phaseolunatin is therefore the *dextrose ether of acetonecyanhydrin* $(CH_3)_2 : C(CN).O.C_6H_{11}O_5$.

The seeds produced by *Phaseolus lunatus* vary in toxicity and in the colour of their seed-coats, depending upon the care bestowed on the cultivation of the plant. In Mauritius, where the plant is grown for use as a green manure, the seeds furnish, when moistened with water, from 0·041 to 0·088 per cent. of prussic acid, and possess dark brown or purple seed-coats; in India the seeds, which are imported into this country under the name of "Rangoon" or "Paigya" beans, and are used for the manufacture of cattle foods, are pink with purple spots, and yield only 0·004 per cent. of this acid, whilst the large, white Lima or duffin beans, produced by long-continued cultivation of the plant, yield no prussic acid, although they still contain the enzyme emulsin.

It is suggested that if hydrocyanic acid or its precursors—the cyanogenetic glucosides—in plants, may be regarded as formative materials utilised for the synthesis of proteids, then the absence of such glucosides from the cultivated seeds of *Phaseolus lunatus*, and from those of the cultivated almond, may be the result of more active metabolism induced by improved conditions of growth, so that no supplies of the glucoside are available for storage as reserve material in the seeds.

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[1] Ransom, Hoppe Seyler's *Zeitschrift f physiol. Chemie*, Band xxix and xxxi.

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